

احمد نواز - عیسیٰ
(10 - 11)

تم ارفع بواسطه
م. معن ابو عیسیٰ

PTU

Faculty of Engineering

Engineering Economy

First Exam

22/5/2012

Second Semester 2011/2012 Date ~~22/5/2012~~

Q1) Answer the following statement with true or false: (5 Points)

1. ~~T~~ --- Interest rates are always expressed as a percentage over an annual time period.
2. ~~T~~ --- When interest is compounded annually, the amount of money accumulated in one year is not the same under either a simple or compound interest scenario.
3. ~~F~~ --- A company's minimum attractive rate of return is generally equal to the rate of return obtainable on a bank savings account.
4. ~~T~~ --- In the interest formulas, a simple interest can be used in any of the single payment formulas as long as the n values correspond to the interest period.
5. ~~F~~ --- In calculating the present worth of an arithmetic gradient series, the only difference between an increasing and a decreasing gradient calculation is the minus sign for the base amount.
6. ~~F~~ --- In solving from an unknown interest rate involving only the F/P formula, it is possible to solve for i directly by rearranging the equation.
7. ~~T~~ --- If you multiply the A/P , P/G , and F/A factors together, you will obtain the value for the F/G factor
8. ~~T~~ --- For a shifted gradient that begins in year four and ends in year 12, the factor $(A/G, i\%, 12)$ will yield an A value in years 1 through 12
9. ~~F~~ --- A nominal interest rate always has a compounding period equal to or less than a year.
10. ~~F~~ --- When deposits are made into an account between compounding periods, those deposits do not begin to accrue interest until the next interest period begins.

1	2	3	4	5	6	7	8	9	10
T	T	F	T	F	F	T	T	F	F

Q2) Choose the most correct answer: (15 points)

1. A quick, rough estimate of the time required for money to double can be obtained by dividing which of the following numbers by the compound interest rate?
a. 100 **(b) 72** c. 64 d. 52
2. The amount of money five years ago that is equivalent to \$1000 now at 10% per year compound interest is nearest to:
(a) \$621 b. \$667 c. \$1500 **(d) \$1611**

3. All of the following are examples of cash inflows except:
- a. Income taxes
 - ☒ b. Operating cost reduction
 - c. Asset salvage value
 - d. Construction cost savings
4. When the interest rate is 10% per year, all of the following are equivalent to \$5,000 now except:
- a. \$4,545 one year ago
 - ☒ c. \$5,500 one year hence.
 - b. \$4,021 two years ago.
 - d. \$6,050 two years hence.
5. The equation that is used to calculate a present worth from a single future amount is:
- a. $P = F(1 + i)^n$
 - ☒ c. $P = F[1 / (1 + i)^n]$
 - b. $P = F[1 / (1 + i)^n] - 1 / i((1 + i)^n)$
 - d. $P = F[(1 + i)^n - 1] / i$
6. The operating cost of a small machine is \$800 in year one, \$900 in year two, \$1000 in year three, increasing by \$100 per year through year ten. At an interest rate of 8% per year, the equivalent annual worth of the machine is nearest to:
- ☒ a. \$1187
 - b. \$2598
 - c. \$1149
 - d. \$7966
7. A young couple wishing to save money for their child's first year in college purchases an insurance policy that will yield \$10,000 fifteen years from now. The cost of the policy is \$500 per year for 15 years, beginning one year from now. The rate of return on their investment is nearest to:
- a. 3%
 - b. 4%
 - ☒ c. 5%
 - d. 6%
8. The length of time required for money to quadruple in value at an interest rate of 6% per year is nearest to:
- a. 12 years
 - b. 18 years
 - ☒ c. 24 years
 - d. 30 years
9. An investment of \$1,000 per year in years four through ten is equivalent to a single investment in year eleven at an interest rate of 10% per year that is nearest to:
- a. \$7716
 - b. \$8488
 - c. \$9133
 - ☒ d. \$10436
10. Payments of \$1,000 in year two and \$4,000 in year five are equivalent to uniform payments in years three through seven at an interest rate of 10% per year nearest to:
- a. \$899
 - ☒ b. \$1057
 - c. \$1177
 - d. \$3732
11. At an interest rate of 10% per year, expenditures of \$1,000 in years zero, three and six could be replaced by a single investment in year eight nearest to:
- a. \$3621
 - ☒ b. \$4964
 - c. \$3964
 - d. \$5721
12. An interest rate of 1% per month is the same as:
- a. Nominal 3% per quarter compounded monthly.
 - b. Effective 12.683% per year compounded monthly.
 - ☒ c. Nominal 12% per year compounded monthly.
 - d. All of the above.
13. When interest is compounded continuously:
- ☒ a. The cash flow must also occur continuously.
 - b. The cash flow must be converted into continuous cash flow.

- c. The interest rate must be converted into an annual rate.
d. None of the above

14. An interest rate of 12% per year compounded continuously is the same as:

- a. Nominal 1% per month compounded continuously
(b) Effective 1.08% per month compounded continuously
c. Effective 12.683% per year compounded continuously
d. None of the above.

15. Income from a certain operation is expected to be zero in years one through five, after which it will be \$50,000 per year forever. The capitalized cost of the income at 10% per year is nearest to:

- a. \$252300 b. \$282250 c. \$310450 **(d) \$500000**

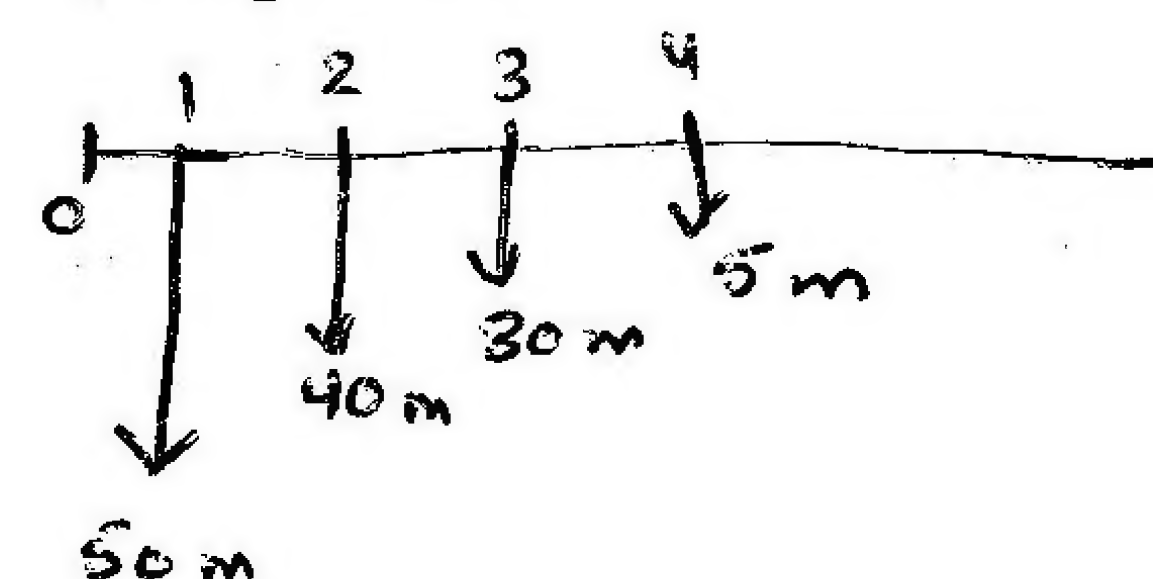
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
b	d	b	c	c	a	c	c	d	b	b	c	a	b	d

Q3) A start-up internet service provider expects to lose money in each of the first four years. Losses are projected to be \$50 million in year one, \$40 million in year two, \$30 million in year three and \$5 million in year four. An interest rate of 10% per year is used

- a. The present worth of the losses for the first three years is nearest to: (10 points)

$$P = F(P/F, 10\%, 1) + F(P/F, 10\%, 2) + F(P/F, 10\%, 3)$$

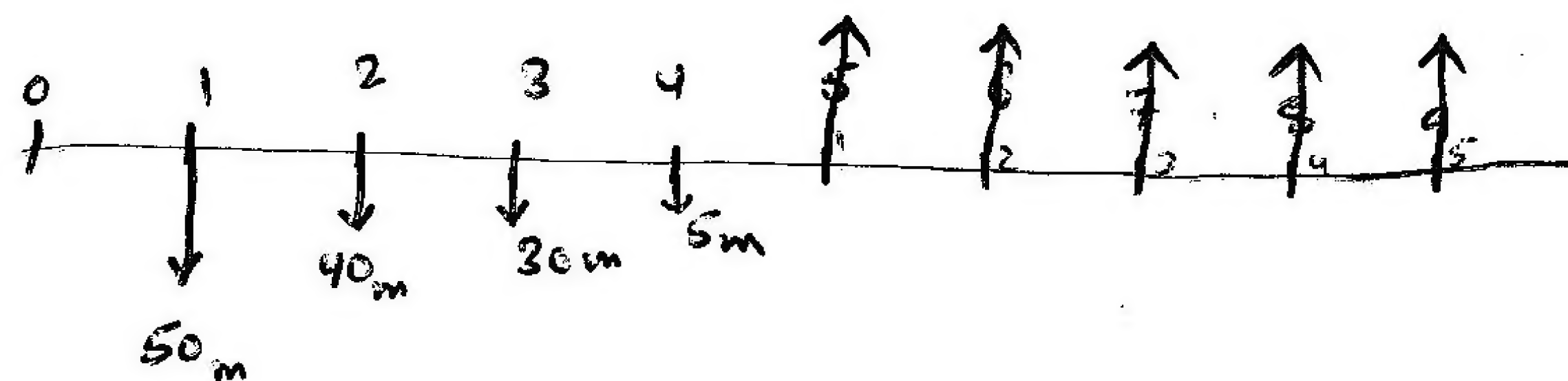
$$= 50m(0.909) + 40m(0.8264) + 30m(0.7513)$$



$$P = 80,759,900$$

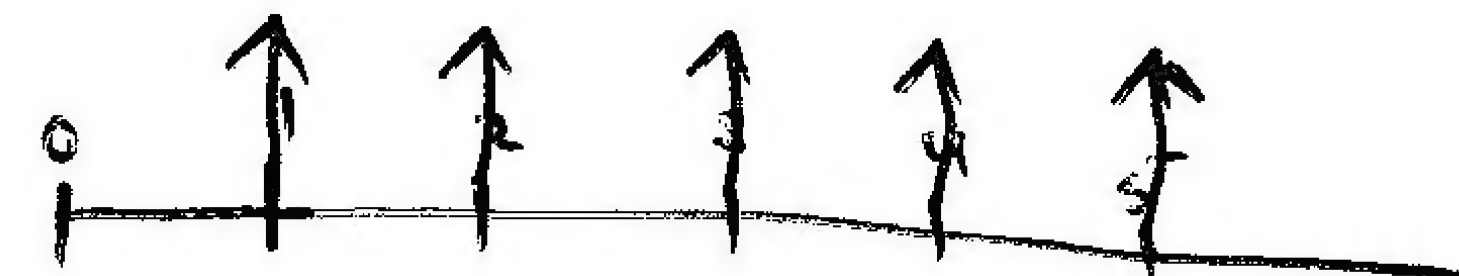
- b. In order to recover the losses by the end of year nine, the company's equivalent uniform annual profit in years five through nine must be nearest to: 0.6830

$$P = 80,759,900 + 5m(P/F, 10\%, 4)$$



$$P = 80,759,900$$

$$P = 841,749,00$$



$$A = P(A/P, 10\%, 5) = 841,749,00(0.2638)$$

$$A = 22205338$$

3

Q4) The number of years from now that an initial investment of \$1,000,000 would be recovered from uniform receipts of \$131,000 per year beginning three years from now at an interest rate of 10% per year is nearest to: (5 points)

$$F = P(1+i)^n$$

$$n \approx 21 + 3$$

~~$$1,000,000 = 131(1.1)^n$$~~

$$n \approx 24$$

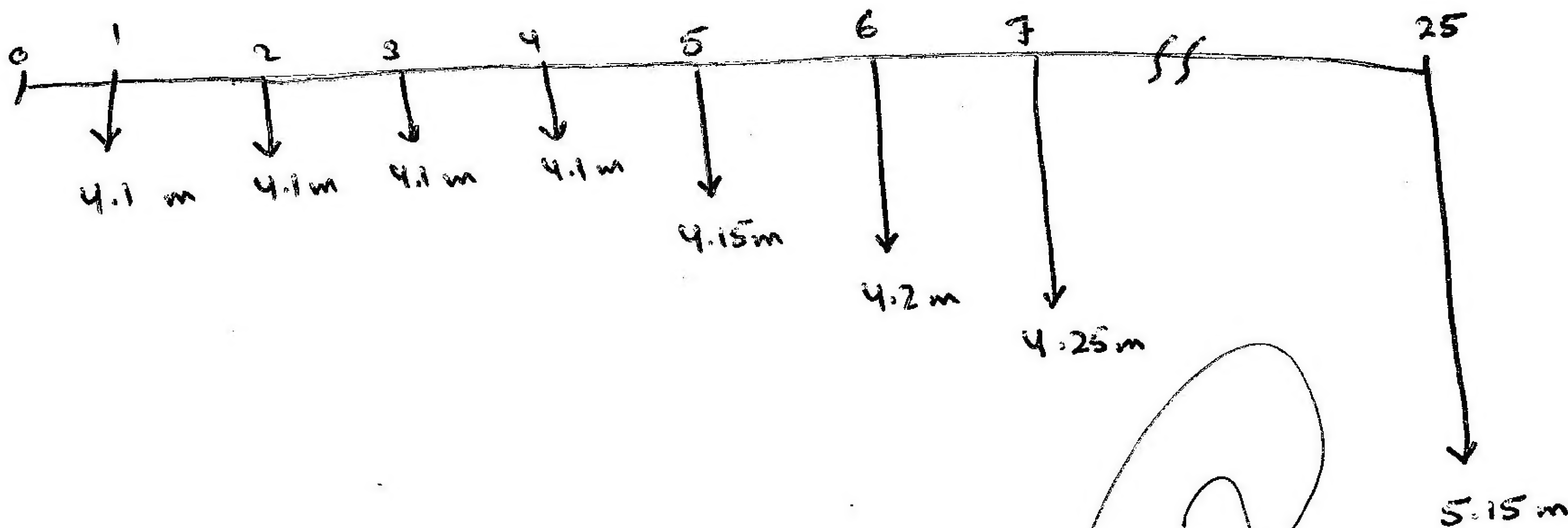
$$1,000,000 = 131,000 \cdot (1.1)^n$$

$$7.633 = (1.1)^n$$

2

5) San Antonio is considering various options for providing water in its 50-year plan, including desalting. One brackish aquifer is expected to yield desalted water that will generate revenue of \$4.1 million per year for the first 4 years, after which less production will decrease revenue each year by \$50,000 per year. If the aquifer will be totally depleted in 25 years, what is the present worth of the desalting option at an interest rate of 6% per year? (5 points)

$$i = 6\%$$



$$P = F(P/F, 6\%, 4) + G(P/G, 6\%, 20)(P/F, 6\%, 25)$$

$$= 4,100,000(0.7921) + 50,000(87.23)(0.2330)$$

$$P = 4,263,839.5$$